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POPULAR MANUAL
OF
VOCAL PHYSIOLOGY
AND
VISIBLE SPEECH

BY

ALEXANDER MELVILLE BELL.

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INTRODUCTORY.

THIS work gives a complete view of the actions of the vocal organs, and the resulting elements of speech. The symbols of Visible Speech are used to depict the various motions and positions of the organs. The object of the work is to popularize a knowledge of Vocal Physiology and Visible Speech, and to furnish a text-book by means of which these subjects may be taught in schools and colleges.

The mastery of spoken languages, the exact acquirement of native or foreign pronunciations, and the correction or removal of defects and impediments of utterance, will be accomplished by means of the Science of Speech, as here expounded. The teaching of articulation to the deaf will be especially facilitated.

The following extract from an address recently delivered* shows the reader something of the mode by which the principles herein developed were originally worked out by the author :

“I had hereditary leanings to the profession of teacher of Vocal Physiology ; and when, in 1841, I began to prepare myself for independent work, I

* Printed in “Science,” February 8, 1889.

sought to supplement what I may call the family knowledge which I possessed by the study of all available books on the subject. I found, however, that but little assistance was to be obtained from this source ; for the art of treating defects of speech had been shrouded in secrecy by nearly all its practitioners. My father* was, in fact, the first to repudiate occult methods in the cure of stammering, and to practise his system openly. At the time I speak of there did not exist in print, so far as I could discover, any precise directory for the processes of articulation. I aimed at teaching these processes, but could not find a single work that gave specific guidance as to what to do, or how to do it, in any given case. Under these circumstances I had to investigate from my own organs and the organs of my pupils. I had many pupils, exhibiting wide varieties of defects and peculiarities, and the observations on these by day became the study of the night.

“Years of this pleasurable devotion to one subject ultimately developed what I had sought in vain to find as a legacy from professional predecessors. In 1849 the first results of my labours were published under the title of ‘A New Elucidation of the Principles of Speech and Elocution,’† forming the kind of directory which I had desiderated before I began to teach. But this work was far from exhausting my phonetic material, which was still, moreover, in-

* Alexander Bell, born in St. Andrew's, 1790 ; died in London, 1865.

† Afterwards divided into two volumes, “Principles of Speech, Dictionary of Sounds, and Cure of Stammering” ; and “Elocutionary Manual—Principles of Elocution.”

creasing. I had become experimentally acquainted with a category of sounds far exceeding those in any language. The peculiar elements in Gaelic, Welsh, Scotch and Irish dialects, provincial and metropolitan English, American English, French, German, etc.—as well as those accidental sounds produced by stammerers, lispers, persons with cleft palate, deaf-mutes, etc.—were familiar to my ear and my vocal organs; and I sought long to incorporate them into one phonetic scheme, where each sound should find its place in due relation to every other sound. The process was the converse of that which had been tried for the collation of a universal alphabet. Eminent linguists had endeavored to collect from every language its peculiar sounds, and from these to frame an alphabet by which all tongues might be uniformly written. But no success had attended the efforts, because the identities and differences among the elements could not be satisfactorily determined. At a conference held in 1854, the object thus aimed at was formally abandoned, and declared to be impossible.

“A different basis, however, seemed to me to promise a different result. My aim was to find a physiological instead of a linguistic basis for the desired universal alphabet. I therefore sketched out mouth regions, divided as it were by lines of latitude and longitude, and endeavoured to locate in my chart every sound which I could form, or which I could distinguish, whether linguistic or not, so as to bring under review all the varieties that could be produced by the organs of speech. From such a category, I reasoned, the phonetic elements of any and every language might undoubtedly be

selected and identified. The undertaking was an arduous one, filling up the night-work hours of many years; but it was at last accomplished in the system of 'Visible Speech,' published in 1867."

The plan of exposition adopted in the Inaugural Work was to illustrate mainly by diagrams and tables. The plan in the present book is to explain in detail the formation and the sound of every element. The first publication was adapted only for students of Philology; this publication aims to enlist its students from the general public and from advanced classes in schools and colleges.

Vocal physiology should be included in the curriculum of normal schools, as an important part of the education of teachers; and every student preparing for missionary work ought to be an expert in Visible Speech. Many missionaries have already testified to the great facility they have experienced in acquiring languages through their knowledge of the system. The Science and Art of Speech—embraced under the title "Vocal Physiology"—should claim the interest, not only of teachers and linguists, but of every educated person.

In providing a manual of the details of comparative Phonetics this little work fills a place hitherto vacant. The subject could not have been made clear without the organic symbols here used in its illustration. This expository application of Visible

Speech is distinct from its original purpose, namely, the transliteration of all languages in one alphabet. The great variety of sounds scattered through living tongues will probably be reduced to a comparatively small number in the international language of the future. The chances of selection for a world-language seem to be broadly in favour of English—modified, in its letters and otherwise, where necessary. But while the present babel-confusion exists in the world, the symbolic phoneticism of “Visible Speech” will be more and more felt to be a necessity.

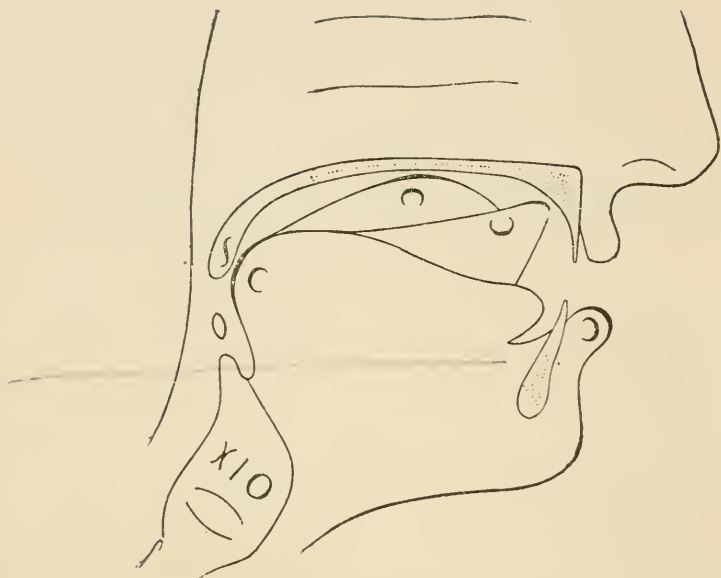
In the Inaugural volume on Visible Speech* the breathings of the principal speech-elements were shown to be of definite musical pitch. In this work these pitch relations are more fully elaborated, with the view of furnishing the student with absolute criteria of accuracy in the formation of the principal sounds.

* “Visible Speech, The Science of Universal Alphabetics.” 4to, 1867.

VOCAL PHYSIOLOGY AND VISIBLE SPEECH.

SECTION FIRST.

FUNDAMENTALS.



FUNDAMENTAL SYMBOLS.



VISIBLE SPEECH AND VOCAL PHYSIOLOGY.

SECTION FIRST.—FUNDAMENTALS.

1. Vocal Physiology includes all the positions and modes of action of the organs of speech. Visible Speech consists of symbols which *depict* the organic positions and actions that produce the sounds of the symbols.

2. Every symbol—except where closure is indicated—*implies emission of breath* through the aperture formed by the position symbolized. The Chest—the bellows of the speaking machine—is therefore assumed to be always well charged with air for due delivery of breath in sounding the symbols.

ORGANIC SYMBOLS [see diagram opposite].

C. *Name of Symbol, "Back."*

3. The symbol *c* presents the curve of the *back* of the tongue. This curve, therefore, means that the back of the tongue is approximated to the back of the mouth [the soft palate], while breath is squeezed out between the tongue and the palate. The result is a *guttural hiss*. This sound is heard

as an interjection of disgust; also as a linguistic element [see par. 39].

4. The quality of the guttural hiss is modified by the position of the tongue in reference to the soft palate. The symbol *c* denotes the middle position. Addition of the sign *◁* ["inner"] denotes a lower, more retracted position; and the sign *▷* ["outer"] a higher, more advanced position. The three positions should be familiarized by practice, because they correspond to *vowel positions* which will be learned in a subsequent section. The student will notice, in practising these breathings, that *c◁* is three semitones lower in musical pitch, and that *c▷* is two semitones higher than *c*.*

◌. *Name of Symbol, "Top."*

5. The *top* of the tongue approximated to the top of the palate presents the curve of the symbol ◌. This curve, therefore, means that the tongue is arched towards the roof of the mouth, while breath is squeezed out between the tongue and the palate. The resulting *palatal hiss* is a linguistic element [see par. 39].

The musical pitch of the breathing of ◌ is an octave higher than that of *c*.

6. The sound of ◌ has a slightly different quality according to the position of the tongue within the

* See "Scale of Consonant Pitch," Section Fourth.

palatal arch. Thus, ɔ̹ has a position midway between ɔ and ɔ̹, and ɔ̹ a position close to the gum. The pitch of the breathing of ɔ̹ is three semitones lower than that of ɔ.

U. *Name of Symbol, "Point."*

7. The point of the tongue approximated to the upper gum presents the curve of the symbol ɔ. This curve, therefore, means that the tongue is raised towards the gum, while breath is squeezed out over the tip. The effect is a dull hiss, accompanied by more or less *vibration* of the tongue. This is a linguistic sound [see par. 39]. The pitch of the breathing of ɔ is an octave lower than that of ɔ; consequently, ɔ and ɔ have the same pitch.

ɔ. *Name of Symbol, "Lip."*

8. The curve ɔ presents the outline of the lip. This symbol, therefore, means that the lips are approximated while breath is squeezed out between them, as in *blowing to cool*. The pitch of the breathing of ɔ is an octave lower than that of ɔ; consequently, ɔ, ɔ, and ɔ have the same pitch.

MIXED ORGANIC SYMBOLS.

ɔ. *Name of Symbol, "Back-Mixed."*

9. The meaning of the "Mixed" curves is that the effect of the primary curve is modified by that of its *opposite*. The "Back-Mixed" symbol, ɔ, therefore,

signifies that the back of the tongue is approximated to the soft palate, as for *c*, while the lips are contracted so as to give the Back hiss a labial modification [see par. 41]. The pitch of the breathing of *c̣* is seven semitones lower than that of *c*.

Ω. Name of Symbol, "Top-Mixed."

10. The symbolic meaning of the Top-Mixed curve is that the tongue is arched nearly as for *o*, while the fore part of the tongue is, at the same time, slightly raised. The resulting hiss is a very common linguistic element [see par. 41]. The pitch of the breathing of *Ω* is five semitones lower than that of *o*.

∪. Name of Symbol, "Point-Mixed."

11. The Point-Mixed curve *∪* shows that the point of the tongue is raised nearly as for *o*, while the middle of the tongue is, at the same time, slightly raised. The effect is to give the hiss a much sharper quality. The sound is a very common linguistic element [see par. 41]. The pitch of the breathing of *∪* is five semitones higher than that of *o*.

∩. Name of Symbol, "Lip-Mixed."

12. In producing the effect of *∩*, the tongue lies in the bed of the jaw, with its edges against the lower teeth. When the tongue is drawn back towards the soft palate, as for *c̣*, the enlarged cavity of the mouth gives the breath a much graver quality.

The latter position is represented by the Lip-Mixed curve $\mathfrak{c}$. This sound is an English element [see par. 41]. The pitch of the breathing of $\mathfrak{c}$ is an octave lower than that of $\mathfrak{c}$; consequently, $\mathfrak{c}$ is two octaves lower than $\mathfrak{c}$.

THROAT SYMBOLS.

O. *Name of Symbol, "Aspirate."*

13. The expanded condition of the throat in *respiration* is denoted by a circle. Thus, O means emission of breath directly from the throat. This is the sound of *h*. The pitch of O, as an element of a word, varies with that of the sound with which it is connected. The aspirate is, then, merely a breathing through the aperture of the allied sound. Thus, *h* before *e* is a breathing of *e*; before *ah* a breathing of *ah*, etc.

O. *Name of Symbol, "Throat."*

14. The narrowed condition of the throat passage, which modifies breath into *whisper*, is denoted by an oval. Thus, O. Example: OO, OO, a *quiet chuckle*.

I. *Name of Symbol, "Voice."*

15. The linear form of the throat aperture—the glottis—in forming *voice* is denoted by a straight line. Thus, I. Example: OI, OI, a *laugh*. The sound of the simple line is without any definite vowel modification.

†. *Name of Symbol, "Round Voice."*

16. The symbol ɹ implies that the lips are spread so as not to influence the sound. A bar across the line denotes that the lips are drawn across the mouth, giving the voice a "Round" quality, but without definite vowel modification. Thus, †.

Example: o†, o†, a *jeer*.

Voiced Symbols.

17. The voice-line may be incorporated with any of the organic symbols—making ɛ ("Back Voice") from c, θ ("Throat Voice") from 0—to denote that the actions are made with voice instead of mere breath. The vocalized *curves* are all elements of speech [see par. 40].

§. *Name of Symbol, "Nasal."*

18. The opening of the *nasal* passage is denoted by the sign §, written after the element to which it refers. Thus, o§, *h* nasalized; θ§, a *groan*. The nasal passage is always understood to be closed, except when this symbol is used.

§. *Name of Symbol, "Trill."*

19. The sign § denotes vibration of the organ represented in the preceding symbol. Thus:

θ§, throat vibration [of the epiglottis]; *growl*.

ɛ§, guttural vibration [of the uvula]; *burr*.

ω§, tongue vibration; *trilled r*.

ə§, lip vibration; *herd's call to cattle*.

χ. *Name of Symbol, "Catch."*

20. The symbol χ denotes the closing and opening of the throat aperture [the glottis], as in coughing, straining, exploding a vowel, etc. Thus, χΟ, a sound of effort; χΟχ, clearing the throat. The sound of χ is a linguistic element in some languages; *e. g.*, it is used instead of *t* between vowels in the dialect of Glasgow [Scotland], as in the words *water*, *butter*, etc. It is also one of the so-called "Tones" in Chinese.

< . *Name of Symbol, "Suction."*

21. An arrowhead pointing to *left* denotes that the preceding element is formed by *inward* action of the breath. Thus, Ο<, inspiration; ɔ<, sipping; Ι<, an ejaculation of pain.

> . *Name of Symbol, "Breath."*

22. An arrowhead pointing to *right* denotes *outward* action of the breath [implied in all ordinary speech elements]. Thus:

Ο>, Ο>, inspiration and expiration.

Ι< Ι>, imitation of a donkey's call.

· . *Name of Symbol, "Stop."*

23. The symbol · denotes a *stop* of the breath while the organs retain their position for the preceding element. Thus, χ· denotes closure of the throat without subsequent opening of the passage;

$i \cdot$ represents a stammerer's difficulty in forming a vowel; $p \cdot t \cdot k \cdot$ represent the closures without the openings of these consonants.

$< \cdot$. *Name of Symbol, "Suction Stopped."*

24. The symbol $< \cdot$ combines $<$ and $\cdot$, and denotes an effort of *suction* while the breath is shut off from the mouth. This is the mechanism of certain elements called "clicks." These peculiar sounds are not confined to barbarous tongues. Examples in English may be cited. A common interjection is formed by suctional finish of the action of t . Thus, $t< \cdot$, expressive of *vexation*. The suctional finish of p produces another well-known sound. Thus, $p< \cdot$, the sound of a *kiss*.

$\cdot >$. *Name of Symbol, "Breath Stopped."*

25. The symbol $\cdot >$ combines $>$ and $\cdot$, and denotes *percussive* separation of the oral organs without emission from the throat. A smoker's puff supplies a good example of the effect of "Breath Stopped." In this case the action of a p is finished percussively, forcing out the orally compressed breath, while the back of the mouth is closed by contact of the tongue and soft palate. All consonants, in good articulation, are formed with more or less of this *breathless oral percussiveness*.

26. The two modes of oral action—suctive and

percussive—should be practised in contrast until the nature of each is thoroughly understood.

Exercise: $p<\cdot$, $t<\cdot$; $p\cdot>$, $t\cdot>$, $k\cdot>$.

The sounds should be strongly audible without emission from the throat.

†. *Name of Symbol, "Holder."*

27. The sign † denotes *prolongation* of the preceding element. This is the mark of a long vowel. But the continuance of any sound, or even of any *silent* organic position, may be indicated in the same way. For example:

$m†$, musing; $s†$, hissing; $sh†$, hushing.

"That†,

And then, I grant, we put a sting in him."

| | . *Name of Symbols, "Sides" or "Side."*

28. The sign | | denotes the opening of *side* apertures [or the sign | the opening of one side aperture] after a shut position of the mouth. Thus, p —which is normally finished by separation of the lips—may be finished by the opening of only a corner, or both corners, of the lips. This peculiarity would be written $p\ |$ or $p\ | |$. So t —which is normally finished by removal of the point of the tongue from the gum—may be finished by removal only of one side, or of both sides, of the tongue. Thus, $t\ |$ or $t\ | |$. This mode of articulation is a necessary characteristic of t and d before l in the same word; as in *lit-*

tle, outline, meddle, deadlock, where, being unavoidable without hiatus, it needs no symbolizing.

‘. *Name of Symbol, “Abrupt.”*

29. The sign ‘ denotes *abruptness*. Ordinary short vowels require no distinguishing mark; but a very abrupt utterance is an occasional peculiarity which calls for expression. Thus :

i‘, an ejaculation of surprise.

no‘, a careless negative.

’. *Name of Symbol, “Hiatus.”*

30. The sign ’ denotes *hiatus* between sounds that normally flow into one another like elements of a syllable. Hiatus between an initial consonant and a vowel is common in Irish pronunciation. Thus p’aper. But the Irish hiatus is often accompanied by aspiration, in which case the sign > should be used.

Λ. *Name of Symbol, “Close.”*

31. The sign Λ is used to denote a close *compressive* action of the organs in forming the preceding element. Thus xΛ 0†, a spasmodic cough. Impassioned elocution makes frequent use of this effect; as in—

“And mingle *k*Λisses such as I would give them.”

v. *Name of Symbol, “Open.”*

32. The sign v is used to denote an open and *loose* formation of the preceding element. If this

symbol were printed wherever the effect occurs in common oratory, the printer would need a very large supply of the type. Such a record might have the effect of checking the habit of indefinite pronunciation.

˘. *Name of Symbol, "Inversion."*

33. The sign ˘ denotes *inversion* of the tongue in forming the preceding element. This mode of articulation occurs in some words and "clicks" in East Indian and African tongues. As an individual peculiarity, the sound of *r* is sometimes formed in this way, with the tongue turned backward within the arch of the palate. Thus *r*˘.

,. *Name of Symbol, "Protrusion."*

34. The sign , denotes *protrusion* of the tongue—an ungainly mode of forming lingual consonants. The element *th* is especially liable to this fault; but *t*, *d*, *n*, *l*, *r* are frequently deformed in the same way.

◊. *Name of Symbol, "Whistle."*

35. The symbol ◊ denotes the sound of *whistling*. The same symbol with the voice-line incorporated [◊] denotes a *vocalized* whistle. A *lingual* whistle, formed with the raised and grooved point of the tongue, may be expressed by the symbol ◊◊ [inner whistle].

36. The student will now be conscious that any action of the mouth can be written by physiological sym-

bols, such as are here described. For example, the action of *t*, struck from the *lips*—an effect heard in ejecting a particle from the point of the tongue—is clearly expressed by *t*₃. In subsequent sections, the scheme of oral symbols is completed by signs for the various consonant and vowel positions.

TONE, PITCH, AND ACCENT.

37. Inflexion, Pitch, and Accent are denoted by the following signs:

— Level tone.

/ Simple rise.

\ Simple fall.

v Compound rise: falling and rising on one syllable.

^ Compound fall: rising and falling on one syllable.

∧ Rising wave: rising, falling, and rising on one syllable.

[Higher than preceding pitch.

] Lower than preceding pitch.

¹ Accent [stress]: written high, as in “a¹way.”

₁ Emphasis: written low, as in “The ₁one thing needful.”

SECTION SECOND.



CONSONANTS.



SECTION SECOND.—CONSONANTS.

38. The complete scheme of consonants is now to be introduced. All consonants have more or less of the hissing or percussive effects already described.

39. *Simple Curves*.—The simple curves depict four consonant actions, as described in Section First, namely:

<i>Back.</i>	<i>Top.</i>	<i>Point.</i>	<i>Lip.</i>
c	o	u	v

The sounds of these symbols are: A guttural, a palatal, a lingual, and a labial *hiss*.

c is the sound of *ch* in *nach* [Ger.]; of *ch* in *loch*, and *gh* in *laigh*, lā c [Scotch].

o is the sound of *ch* in *ich* [Ger.]; and of *h* in *hue*.

u [non-vocal *r*] is the sound of *r* in *etre* [Fr.], and of *rh* [Welsh].

v is the sound of *blowing to cool*.

Non-vocal *r* is not usually recognized in English, but it really occurs when *r* precedes a non-vocal consonant, as in *ark*, *art*, *harsh*, *furce*, *worse*, *earth*. The Anglican *glide-r* is, however, a more euphoni-ous sound in these cases. [See Glides.]

40. The simple curves, with voice-line added, depict four vocalized consonants, namely :

Back Voice. Top Voice. Point Voice. Lip Voice.

€

ϣ

ω

Ϸ

These have the same oral actions as the preceding, producing a guttural, a palatal, a lingual, and a labial *buzz*.

€ is the sound of *g* in *berge* [Ger.] ; also of guttural *r* [smooth burr].

ϣ is the sound of *y* in *yes*.

ω is the sound of *r* in *ray*.

Ϸ is the sound of *w* in *wie* [Ger.] ; also of *b* in *hablar* [Span.]

41. *Mixed Curves*.—The mixed curves depict four consonant actions, namely :

Back-Mixed. Top-Mixed. Point-Mixed. Lip-Mixed.

Ⓒ

Ω

Ϸ

Ϸ

The small curves on the ends of the primary curves are the organic opposites of the latter, and signify that the positions they indicate modify the primary sounds. Thus :

Ⓒ [back hiss modified by lips] the sound of *ch* in *leuch*, *lëooⒸ* [Scotch].

Ω [Top hiss modified by raised point of tongue] the sound of *sh* in *she*.

Ϸ [Point hiss modified by raised middle of tongue] the sound of *s* in *see*.

ɔ [Lip hiss modified by back of tongue] the sound of *wh* in *why*.

42. The mixed curves, with voice line added, depict four vocalized consonants, namely:

<i>Back-Mixed Voice.</i>	<i>Top-M. V.</i>	<i>Point-M. V.</i>	<i>Lip-M. V.</i>
ɛ	ɔ	ʊ	ə

These have the same oral actions as the preceding and produce a corresponding series of buzzes instead of hisses.

ɛ has the sound of a labialized guttural *r*.

ɔ has the sound of [ʒh] *z* in *azure*, *s* in *pleasure*, *ge* in *rouge*.

ʊ has the sound of *z* in *zeal*, *s* in *is*.

ə has the sound of *w* in *we*.

43. *Divided Curves*.—The divided curves depict four consonant positions, namely:

<i>Back Divided.</i>	<i>Top D.</i>	<i>Point D.</i>	<i>Lip D.</i>
ɛ	ɔ	ʊ	ə

The divided curves indicate that the organs are so adjusted as to direct the breath into *side* channels. Thus, ɛ shows that the breath, while centrally obstructed, is squeezed out over the sides of the root of the tongue; ɔ shows that the breath, obstructed by the arched top of the tongue, is squeezed out through narrow channels over the sides; ʊ shows that the breath, obstructed by the point of the tongue on the gum, flows out through wide chan-

nels over the sides; and 3 shows that the breath, obstructed by contact of the centre of the lip on the teeth, escapes through lateral crevices.

ε has a sound like the hiss of a *water-fowl*.

Ϣ represents a frequent form of defective s.

ω is a non-vocal l.

3 has the sound of f.

Non-vocal l is almost inaudible, because the breath is not compressed in passing through the wide channels of emission. This element is not usually recognized in English, but it really occurs when l precedes a non-vocal consonant, as in *elk, felt, whelp, else, pulse, Welsh, filch, self*.

44. The divided curves, with voice-line added, denote guttural, palatal, lingual, and labial side emissions of voice. Thus:

<i>Back Divided Voice.</i>	<i>T. D. V.</i>	<i>P. D. V.</i>	<i>L. D. V.</i>
ε	Ϣ	ω	3

ε has the sound of “fat l” [guttural l] in Gaelic, as in *laogh*.

Ϣ has the sound of *gl* in Italian; a common Irish variety of l.

ω has the sound of l in *lie*.

3 has the sound of v in *vie*.

The sound of l [Point Divided Voice], on account of the width of its side channels, has a vowel-like clearness of voice. The other divided consonants

have narrow apertures and, consequently, a fricative or buzzing effect. The same buzzing quality may, however, be given to *l* by contracting its apertures. The position of the tongue will then be that of the "Top-Mixed Divided" symbol. [See par. 45.]

45. *Mixed Divided Curves*.—These symbols depict four consonant positions, namely:

<i>Back-Mixed Divided.</i>	<i>T.-M. D.</i>	<i>P.-M. D.</i>	<i>L.-M. D.</i>
ɛ	ɹ	ʋ	ʒ

The effect of "Mixed," and also of "Divided," has been explained. [See par. 41–43].

ɛ has no linguistic value. It is a labialized side hiss from the back of the tongue.

ɹ *ll* [Welsh]. A lateral hiss from the middle of the tongue, formed by contracting the apertures of ʋ.

ʋ *th* in *thin*. Produced by placing tip of tongue on upper teeth, while front surface of tongue rises to rim of palatal arch, leaving crevices for breath over *sides of the tip*.

ʒ a gutturalized *f*.

Th is often formed by protruding the tongue between the teeth, but this is ungraceful.

46. The Mixed Divided curves, with voice-line added, depict the four vocalized consonants:

<i>Back-Mixed Divided Voice.</i>	<i>T.-M.D.V.</i>	<i>P.-M.D.V.</i>	<i>L.-M.D.V.</i>
ɛ	ɹ	ʋ	ʒ

ε has no linguistic value. It is a labialized guttural *l*.

η a fricative or buzzing *l* [Welsh *ll* vocalized]; Zulu *l*.

ω *th* in *then*.

ζ a gutturalized *v*.

47. *Shut Curves*.—These symbols depict four consonant positions, namely:

<i>Back Shut.</i>	<i>Top Sh.</i>	<i>Point Sh.</i>	<i>Lip Sh.</i>
α	Ω	ϙ	⊖

Audible *separation* of the organs after closure is *implied*. This separation is important to distinctness in pronouncing final consonants. For modes of finishing closures, see par. 23–28. Stammerers and others who have difficulty in pronouncing the shut consonants must bear in mind that the audible part of these elements is only the separation of the organs after closure; that the closure itself involves no pressure, and that the action affects only the soft parts of the mouth—the tongue and the lips, and not the jaw, the head, or the chest.

The sounds of the shut curves are—

α *k* in *key*, *c* in *cat*, *q* in *quick*.

Ω *t* as pronounced by tongue-tied speakers; palatal *t*, a separate element in East Indian tongues.

ϙ *t* in *tight*.

⊖ *p* in *peep*.

48. The shut curves, with voice-line incorporated, depict the four consonants:

Back Shut Voice. *Top Sh. V.* *Point Sh. V.* *Lip Sh. V.*
   

The voice in these elements is a mere muffled murmur heard during the closure. Both oral and nasal passages being closed, the voice has no place of issue, and is therefore incapable of prolongation. The separation of the organs in pronouncing the shut-voice consonants should be accompanied by the breathless oral percussion described in par. 25.

 has the sound of *g* in *go*.

 the sound of *d* as pronounced by tongue-tied persons, but a separate element in some languages.

 the sound of *d* in *die*.

 the sound of *b* in *buy*.

49. *Nasal Consonants*.—The shut curves, with nasal sign incorporated, depict four nasal consonants, namely:

Back Nasal. *Top Nasal.* *Point Nasal.* *Lip Nasal.*
   

The opening of the nasal passage is effected by slightly depressing the top of the soft palate, by which means the breath is divided into a nasal and an oral stream. Any consonant may be “nasalized”—as , nasalized *y* [a Polish sound]; but only a shut position can yield a consonant which is wholly

“nasal.” The non-vocal nasals have but little audibility, because the channel of emission is so wide as not to compress the breath. Compression of the nostrils would produce a nasal hiss, but no language has elevated this into an element of speech. The sounds of the nasals are:

ㄱ non-vocal *ng*.

ㄴ non-vocal palatal *n*.

ㄷ non-vocal *n*.

ㅁ non-vocal *m*.

These non-vocal nasals have not been generally recognized in English, but they really occur when *m*, *n*, *ng* are before non-vocal consonants, as in *lamp*, *lent*, *link*, *length*, *inch*, *since*, *hence*.

50. The nasal consonants, with voice-line added, depict a series of the most resonant elements in speech, namely:

Back Nasal Voice. Top N. V. Point N. V. Lip N. V.

ㄱ

ㄴ

ㄷ

ㅁ

The same cause that renders the non-vocal nasals so faint in audibility gives clearness and almost vowel purity to the sounds of the vocal nasals.

ㄱ the sound of *ng* in *sing*, *long*, and of *n* in *ink*.

ㄴ the sound of “palatal *n*,” ñ [Spanish], *gn* [Fr.]

ㄷ the sound of *n* in *none*.

ㅁ the sound of *m* in *maim*.

O. "*Aspirate.*"

51. On account of the absence of compression in the breath-channel the aspirate has but little audibility. Some speakers add throat compression, and pronounce Ɔ for O. Others prefix a vocal sound, and say u-hold, u-heaven, etc. These expedients are unnecessary. The legitimate soft emission of O is sufficiently audible in its effect on the succeeding vowel.

Θ. "*Throat Voice.*"

52. The sound of Θ [vocalized whisper] is a mere hoarse voice, but it is an element of speech. The Arabic *gh* in *ghain* [Θain] has this simple formation.

SECTION THIRD.

VOWELS.

SECTION THIRD.—VOWELS.

53. The complete scheme of vowels is now to be introduced. All the voiced consonants which are represented by simple curves, or by mixed curves, may be *vowelized*; that is, their apertures may be *expanded* so as to remove compression or oral friction from the emitted voice.

I. BACK VOWELS.

54. The Back consonant was shown to have three varieties [see par. 4] dependent on the position of the tongue in reference to the soft palate. These positions are depicted in the symbols $\epsilon \langle$, ϵ , $\epsilon \rangle$. Now, let the student vowelize these three Back consonant sounds, and he will produce the three Back vowels $\imath$, $\jmath$, $\jmath$.

55. These vowel symbols illustrate the principle of vowel representation. A straight line—the sign of voice—is the stem of all vowels, as a curve is of all consonants. The straight line carries on it distinctive marks, which, when on the left of the line, show that the vowels are modified at the back of the mouth. The position of the mark at the top of the line shows that the tongue is high; thus, $\imath$ and $\epsilon \rangle$ denote the same position. The mark at the bottom

of the line shows that the tongue is low; thus, ɹ and ɛ ɹ denote the same position. The mark at both ends of the line shows that the tongue is in the middle position; thus, ɹ and ɛ denote the same position. A little practice will enable the learner to strike these relative attitudes of the tongue with facility, and he will recognize the similarity and the kind of difference between the sounds represented by the symbols ɹ, ɹ, ɹ.

56. The *High Back* vowel, ɹ, is heard in Gaelic in the word *laogh*, ɛɹɹ. It is not an English element. The English sound, oo, has the same position of the tongue as ɹ, combined with a contracted aperture of the lips. Endeavor to pronounce, oo, without using the lips; or, while sounding oo, spread the lips, and ɹ will be heard.

57. The symbol of oo is ɹ̄, showing that the sound is the *High Back Round* vowel. Labial quality is always, as here, represented by a bar across the straight line. Give a slight compression to the lips while sounding ɹ̄, and ə will be heard; or vowelize ə, by removing compression, and ɹ̄ will be heard. These relations are thus exhibited in detail to give the learner a clear idea of the nature of vowel modifications and of the *source of difference between vowels and consonants*.

58. The *Mid Back* vowel, ɹ, is heard in the word *up*. This sound will be obtained by vowelizing ɛ,

ε labialized produces ɛ̃, and ɛ̃ vowelized produces ɔ̃. Endeavor to pronounce ɔ̃ without the lips, or, while sounding ɔ̃, spread the lips, and ɹ will be heard. The symbol for ɔ̃ is ɹ̃, showing the sound to be the Mid Back vowel labialized.

59. The aperture between the lips is broader for ɔ̃ than for oo. Vowels of "High" formation, when "Rounded," have the most contracted labial aperture; those of "Low" formation the least contracted, and those of "Mid" formation have an intermediate aperture, as illustrated in the vowels oo, oh, aw.

60. The *Low Back* vowel, ɹ̃, will be obtained by vowelizing ɛ̃. Labialize ɹ̃ by rounding, without much contracting, the aperture of the lips, and aw will be heard. Try to pronounce aw with the lips spread, or, while sounding aw, spread the lips, and ɹ̃ will be heard. The symbol for aw is ɹ̃̃, which is thus seen to be the Low Back vowel labialized. The sound of ɹ̃̃ is heard in the Scotch pronunciation of the word *up*.

61. So far, we have now obtained the formation and the sounds of the three Back vowels, ɪ, ɹ̃, ɹ̃̃, and of corresponding labialized vowels, ɪ̃, ɹ̃̃, ɹ̃̃̃. Another principle of vowel difference duplicates this series by a "Wide" variety of each vowel. The primary vowels, ɪ, ɪ̃, ɹ̃, may be considered as wide formations of the consonants, ɛ̃, ɛ̃̃, ɛ̃̃̃. A further widening

of the organic aperture, and also expansion of the cavity *behind the tongue*, produces a change in vowel quality—rendering the sounds comparatively obscure and indefinite. Wide quality is symbolized by a hook, instead of a solid point, on the vowel line. Thus: 1, 1̣.

62. TABLE OF BACK VOWELS.

	<i>Back.</i>	<i>B. Wide.</i>	<i>B. Round.</i>	<i>B. W. Round.</i>
<i>High,</i>	1	1	1̣	1̣̣
<i>Mid.,</i>	ɨ	ɨ	ɨ̣	ɨ̣̣
<i>Low,</i>	ɤ	ɤ	ɤ̣	ɤ̣̣

63. The sounds of the Wide Back vowels are:

1, a sound resembling that in *up*, heard in the unaccented syllables *tion*, *tious*.

ɨ, a sound resembling *ah*, but less open in formation, heard in *ask*, *past*, *fast*, *bath*.

ɤ, the most open vowel, heard in *ah*, *alms*, *art*, *father*.

64. The sounds of the Wide Back “round” [labialized] vowels are:

1̣, an indefinite sound of *oo*, heard in *good*, *foot*, *pull*; also before *r*, as in *poor*, *your*; and in unaccented syllables, as in *measure*, *scornful*.

ɨ̣, an indefinite sound of *ō*, heard before *r* in *ore*, *four* [in English usage]; and in unaccented syllables, as in *obey*, *fellow*, *elocution*.

ɤ̣, the sound of “short *o*,” in *on*, *off*, *nor*, *not*.

II. FRONT VOWELS.

65. We have next a series of front vowels corresponding to the back series. Front vowel symbols have their distinctive mark on the right side of the straight line. Thus :

66. TABLE OF FRONT VOWELS.

	<i>Front.</i>	<i>F. Wide.</i>	<i>F. Round.</i>	<i>F. W. Round.</i>
<i>High,</i>	ɪ	ɪ	ɨ	ɥ
<i>Mid.,</i>	ɛ	ɛ	ɜ	ɞ
<i>Low,</i>	ɐ	ɐ	ɤ	ɤ

67. The Top-voice consonant, ɒ, vowelized, yields the High Front vowel, ɪ [ē]. The tongue, shifting its highest point a little farther back on the palate, enlarges the front cavity between the tongue and the teeth, and changes the quality of the sound to the Mid Front vowel, ɛ, ā, é [Fr.] Another shift of the same kind further increases the size of the front cavity, and gives the sound the quality of the Low Front vowel, ɐ, e in *ell*, é [Fr.], ä [Ger.]

68. These Primary Front vowels are related to the Top consonant and its varieties, thus: In attempting to vowelize the “outer” variety, ɒ, the tongue is necessarily withdrawn from the gum, so that the most advanced vowel aperture is over the Top—the highest part—of the tongue. The position for ɪ is therefore the same as for ɒ; that

for ɿ is the same as for ɔɿ; and that for ɹ is a degree farther back on the palate.

69. The Wide vowels of the Front series have sounds resembling those of the Primary vowels, but comparatively dull in quality [see par. 61]. The High Front Wide vowel, ɪ, denotes the regular sound of "short *i*," as in *it, is, ill*. Foreigners confound this sound with ɪ. Repeat, in contrast, the Primary and the Wide High Front vowels, and a *feeling* will be obtained of the kind of organic and phonetic difference, which will serve as a guide to similar variations in other cases. Thus: ɪɪ ɪɪ ɪɪ ɪɪ.

70. The Mid Front Wide vowel, ɛ, is a very common Scotch sound, used instead of ɪ, in such words as *ill, it, in*. English speakers imitate the effect by pronouncing these words *ell, et, en*. The dull sound of ɛ is regularly heard instead of ɹ in the unaccented syllables *ed, less, ness, ment, &c.* Contrast, phonetically, the Primary and the Wide Mid, and the Low Front Vowels. Thus: ɛɛ ɛɛ ɛɛ. The Low Front Wide vowel, ɔ, is the regular sound of "short *a*," as in *am, as, have, man*.

71. The Front Round vowels are all foreign sounds to the modern English speaker :

ɪ ü [Ger.], consists of the sound of $\bar{e}$ passed through the narrow labial aperture of *oo*.

ɪ ʊ [Fr.], consists of the sound of $\bar{a}$, $\acute{e}$ [Fr.], passed through the labial aperture of $\bar{o}$.

ɛ *eu* [Fr.], ö [Ger.], consists of the sound of *é* [Fr.], *ä* [Ger.], passed through the lip-aperture of *aw*.

72. The Front Wide Round vowels differ from their primaries only by being comparatively feeble in organic quality [see par. 61]. French and German orthoëpists must be left to discriminate the varieties in their classifications of words.

ɸ, “short *i*” modified by the lips; a sound between *ii* [Ger.] and *iz* [Fr.]

ɸ, a sound between *iz* and *eu* [Fr.]

ɸ, “short *a*” modified by the lips; a sound used by Londoners instead of the diphthong *ou*, *ow*, in *house*, *town*, ɔɸʊ, ɔɸʊ [see par. 59].

III. MIXED VOWELS.

73. A third series of vowels, called “Mixed,” completes the scheme of vowel sounds. The Mixed vowels partake of the qualities both of Front and Back sounds. The attempt to form a Front and a Back sound simultaneously—or, in other words, to gutturalize a front vowel—will yield the Mixed quality. The symbols exhibit this formation of these elements. Thus: ɪɸ combined form ɪɸ.

74. TABLE OF MIXED VOWELS.

	<i>Mixed.</i>	<i>M. Wide.</i>	<i>M. Round.</i>	<i>M. W. Round.</i>
<i>High,</i>	ɪ	ɪ	ɪ	ɪ
<i>Mid.,</i>	ɪ	ɪ	ɪ	ɪ
<i>Low,</i>	ɪ	ɪ	ɪ	ɪ

75. The consonant relations of the Primary Mixed vowels will assist the learner in giving definiteness to these formations. Thus :

᠋—᠊. The Top-Mixed consonant, vowelized, yields the High Mixed vowel.

᠋—᠊. The Point-Mixed consonant, vowelized, yields the Mid Mixed vowel.

᠋—᠊. The Point consonant, vowelized, yields the Low Mixed vowel.

76. The sounds of the Mixed vowels are the following :

᠊, heard, in the Northern States of America, in the words *her*, *firm*, *church*, etc. This vowel is also very common in Chinese.

᠊, the sound of final *e* in *eine*, *berge* [Ger.]

᠊, heard in English dialects, as in the London hawker's utterance of the word *penny*, pronounced ᠋᠊᠋᠊, and in the Somersetshire pronunciation of the word *sir*, ᠋᠋᠋.

77. The Wide varieties of the Mixed vowels are familiar English elements :

᠊, heard in the unaccented article *the*.

᠊, heard in the unaccented article *a*.

᠊, heard in *er*, *ir*, *yr*, in *her*, *sir*, *myrrh*.

78. The Round varieties of the Mixed vowels are :
᠊, Swedish *u*, a sound between *oo* and *ü*, common in the north of Ireland.

᠊, the sound of *o* in *homme* [Fr.]

ɪ̃, an Irish sound, resembling *aw*, heard in *but*, *come*, *Dublin*.

79. The Wide varieties of the Mixed Round vowels are :

ɸ, the vowel part of unaccented *u* in *fortune*, *nature*. The unwritten sound of *y* precedes the vowel in these syllables.

ɮ, an American pronunciation of *o* in the word *only*.

ɪ̃, the sound of unaccented “short *o*” in *obtain*, *occasion*, *offend*. The accented *a* in *Chicago* has the delicate open roundness of this vowel; thus, $\alpha \text{ } \alpha \text{ } \mathfrak{I} \text{ } \mathfrak{I} \text{ } \mathfrak{I}$.

SECTION FOURTH.

GLIDES PITCH, &c.

SECTION FOURTH.—GLIDES, PITCH, &c.

Glides.

80. In pronouncing such words as *buy*, *boy*, *bough*, we are conscious of a change in the vowel quality from the beginning to the end of the syllable. The first part of the sounds is the same in *buy* and *bough*, and the last part in *buy* and *boy*. These compound sounds are called diphthongs, or double sounds with one syllabic impulse.

81. The second element in a diphthong has not the fixed configuration which characterizes a vowel, neither has it the fricative quality of a consonant. If its sound were momentarily fixed, it would become a vowel, or if its organic aperture were slightly compressed, it would become a consonant. It is a merely transitional sound—a glide. Thus, the elements of speech include three classes: VOWELS, CONSONANTS, and GLIDES.

82. A glide may be an aspirate, or an indefinite sound of voice, or of “rounded” voice, or it may have a soft effect of any of the simple-curve, or the mixed-curve consonants. The symbols of the latter class of glides have the curve of the appropriate consonant

joined to a short straight line, as exemplified in the following table:

83. *Table of Glides.*

Breath Glide, >	Back Glide, ʔ	Point Glide, ʏ
Voice " 1	Back Round, ɛ	Point Round, ʋ
Round " †	Top, ɪ	Lip, ʌ
Throat " ǀ	Top Round, ɔ	Lip Mixed, ɹ

84. The majority of the glides are not required in ordinary linguistic writing. Their chief use is to enable test words and curious combinations to be written in phonetic *fac simile*. The English name-sounds of the letters A and O are gliding vowels; thus, "long a" is pronounced [ɪ, and "long o" ʊ.

85. The English glides are only the following four:

1, voice glide, heard between any long vowel and medial r, as in *fairy, weary, fiery, glory, fury*.

ɪ, top glide, as in *day, die, boy*.

ʏ, point glide, the sound of r, when final or before a consonant, as in *here, air, fire, ore, poor*.

ɹ, lip mixed glide, as in *go, bough*.

Pitch of the Vowels.

86. Vowel apertures produce no fricative quality on the breath, and therefore the pitch of vowel breathings cannot be determined so easily as that of consonants. Besides, the cavities which modify

vowels consist not only of the visible cavity in front of the vowel aperture, but also of one simultaneously formed, behind the tongue; and these two resonance chambers are of different pitch. For example: the outer cavities of the Front vowels form a series *descending* in pitch in the order [i ɪ : while the inner cavities of the same vowels, in the same order, form an *ascending* series.*

87. The pitch of the Mixed vowels is lower than that of the Front vowels, and higher than that of the Back vowels. The Back Round vowels are the lowest in pitch of all the vowels. But, while the pitch of the Back vowels descends from the High to the Low formations, that of the Back Round vowels descends from the Low to the High formations. Thus :

High to Low: ɪ ɪ ɪ, Descending Pitch.

Low to High: ɔ ɔ ɔ, Descending Pitch.

* The existence of these double resonance-cavities in the formation of the Front vowels may be demonstrated by an experiment devised by the author's son, Prof. A. Graham Bell. Thus: Close the throat, as for ɪ, and silently put the organs in position, successively, for ē ā ě, and fillip the neck with a finger, and the percussions will yield the ascending resonance of the inner cavities of these vowels. Then close the back of the mouth, as for ɔ, and, while repeating the silent formation of the same vowels, strike the cheek, or a finger held against it, and the percussions will yield the descending resonance of the outer cavities.

Absolute Pitch of the Consonants.

88. The *relative* pitch of the consonant breathings is probably the same in the utterance of all persons. This characteristic of the sounds, therefore, becomes a guide to uniformity in their formation. Under the head of the respective elements the relative pitch of many of the consonants has been already given. [See Section First]. The following diagram shows the *absolute* pitch of the principal consonants as pronounced by the author. This scale will be of service to students in testing their phoneticism of the same symbols.

89. *Scale of Consonant Pitch.*

The image displays a musical scale on a five-line staff with a bass clef. The scale consists of the following notes: C (below staff), D (first line), E (first space), F (second line), G (second space), A (third line), B (third space), C# (fourth line), D# (fourth space), E# (fifth line), F# (above staff), G# (above staff), and A# (above staff). Below the staff, a series of zigzag lines connect the notes, with numbers indicating the interval in semitones. The intervals are: 2 (C to D), 2 (D to E), 2 (E to F), 1 (F to G), 2 (G to A), 1 (A to B), 2 (B to C#), 1 (C# to D#), 1 (D# to E#), 2 (E# to F#), 2 (F# to G#), 1 (G# to A#), and 2 (A# to the final C). The final note is a C located below the staff, connected to the previous note by a line labeled '2'. A bracket on the left side of the final interval is labeled 'Interval 5 of Semitones.'

Interval 5 of Semitones.

Names of the Symbols.

90. Every symbol in Visible Speech has a name, which should always be used, because it describes the mechanism of the sound. The nomenclature of the system has been found such a great convenience that it has been adopted in nearly all recent Philological works. The following principles regulate the naming of

Consonants: "Organ" first, "Voice" last. Thus: ω , "Point Mixed Divided Voice."

Vowels: "Elevation" first, "Round" last. Thus: $\mathfrak{t}$, "High Back Wide Round."

Glides: "Glide" last. Thus: $\mathfrak{z}$ "Lip-Mixed Glide."

Visible Speech applied to Languages.

91. This Work is confined to the teaching of Vocal Physiology by means of Visible Speech symbols, and at the same time to the teaching of Visible Speech by means of Vocal Physiology. Students who desire to apply the symbols in the writing of languages will find simple English Exercises in the Nursery-book, "Visible Speech Reader;" and also illustrations of Dialects, French, German, etc., in "Sounds and their Relations."* All possible linguistic effects can be expressed with universal intelligibility by the symbols. The learner, who has first brought his

* See List of Works.

own organs under control by the study of this book, will find himself able to analyze the mechanism of any sound he may hear, and to write it so that it will be exactly reproduced by a Visible Speech reader of any nationality.

THE END.





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